

### Exercise 3d (Gerlach method)

The Gerlach scheme for the approximation of  $\sqrt{a}$ ,  $a > 0$  is given by:

$$\left\{ \begin{array}{l} x_{i+1} = x_i - \frac{(x_i^2 - a)(3x_i^2 + a)(3x_i^6 + 27ax_i^4 + 33a^2x_i^2 + a^3)}{2x_i(x_i^4 + 10ax_i^2 + 5a^2)(5x_i^4 + 10ax_i^2 + a^2)} \\ i = 0, 1, 2, \dots \\ x_0 = a/2 \end{array} \right.$$

- 1) Write a matlab function file with input  $a$  and  $I$ , the maximum number of iterations.
- 2) Make a plot of the iteration values  $x_i$  as a function of the index  $i$ . Choose, for example,  $a=2$  and/or  $a=5$ .
- 3) Does it converge? (slow or fast ...?)